PATENT

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In re Application of: Palazoglu	Group Art Unit: 2859
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For: METHODS, SYSTEMS, AND DEVICES FOR EVALUATION OF THERMAL TREATMENT

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PRELIMINARY AMENDMENT

Mail Stop Patent Application
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Please amend the application as follows:

IN THE DESCRIPTION OF THE DRAWINGS:

Please replace the "Brief Description of the Drawings" with the following:

Brief Description of the Drawings

Exemplary embodiments of the subject matter will now be explained with reference to the accompanying drawings, of which:

Figure 1 is a schematic diagram of combining a first and second magnet at opposing magnetic poles to achieve a combined magnet;

Figure 2 is a schematic diagram of the result of combining a first and second magnet at similar magnetic poles to achieve a combined magnet;

Figures 3A, 3C, and 3E are schematic diagrams of a magnetically detectable particle in a state below a predetermined conservative temperature;

Figure 3B, 3D, and 3F are schematic diagrams of the magnetically detectable particle of Figure 3A, 3C, and 3F, respectively, in a state above a predetermined conservative temperature;

Figures 3G-3I are schematic diagrams of the assembly and operation of one embodiment of a magnetically detectable particle comprising multiple magnets;

Figures 3J-3L are schematic diagrams of carrier particles comprising multiple detectable particles;

Figure 4 is a schematic diagram of the principle of forced coupling and fixing similar magnets;

Figure 5A is a schematic diagram of another embodiment of a magnetically detectable particle in a state below a predetermined conservative temperature;

Figure 5B is a schematic diagram of the magnetically detectable particle of Figure 5A in a state above the predetermined conservative temperature;

Figure 6A is a schematic diagram of another embodiment of a magnetically detectable particle in a state below a predetermined conservative temperature;

Figure 6B is a schematic diagram of the magnetically detectable particle of Figure 6A in a state above the predetermined conservative temperature;

Figure 6C is a schematic diagram of another embodiment of a magnetically detectable particle in a state below a predetermined conservative temperature;

Figures 6D and 6E are schematic diagrams of the magnetically detectable particle of Figure 6C in a state above the predetermined conservative temperature;

Figure 6F is a schematic diagram of a carrier particle comprising a detectable particle comprising more than two magnets (e.g. three magnets), all assembled using the same adhesive;

Figure 7A is a schematic diagram of another embodiment of a magnetically detectable particle in a state below a first predetermined conservative temperature;

Figure 7B is a schematic diagram of the magnetically detectable particle of Figure 7A in a state above the first predetermined conservative temperature and below a second predetermined temperature;

Figure 7C is a schematic diagram of the magnetically detectable particle of Figures 7A and 7B in a state above the first and second predetermined temperatures;

Figures 7D-7G are schematic diagrams of carrier particles comprising multiple detectable particles;

Figure 8A is a schematic diagram of another embodiment of a magnetically detectable particle in a state below a predetermined conservative temperature;

Figure 8B is a schematic diagram of the magnetically detectable particle of Figure 8A in a state above the predetermined conservative temperature;

Figure 9 is an experimental system for use in demonstrating magnetically detectable particles, carrier particles, and related devices;

Figure 10 is a still-image perspective view of a simulated particle containing a coupled magnet sensor/detector;

Figure 11 is a still-image perspective view of another simulated particle including a thermocouple lead having contact with a magnet assembly;

Figure 12 is a still-image perspective view of a simulated particle with the experimental system of Figure 9;

Figure 13 is a still-image perspective view of a data acquisition system including a display for presenting acquired temperature information and magnetic field strength data;

Figures 14A-14D are different still-image perspective views of a triple magnet assembly being assembled in a simulated particle;

Figure 15 is still image of a magnet pair with a U.S. penny for providing a size scale perspective;

Figure 16 is a graph of magnetic field strength from two naturally aligned identical magnets with no heating;

Figure 17 is a graph of magnetic field strength from two aligned and attached magnets with no heating;

Figure 18 is a graph of magnetic field strength from two aligned and attached with heating;

Figure 19 is a graph showing applied temperature versus magnetic field strength;

Figure 20 is a graph showing applied temperature versus magnetic field strength;

Figure 21 is a graph showing applied temperature versus magnetic field strength;

Figures 22 is a graph showing applied temperature versus magnetic field strength;

Figures 23-27 are different graphs of experimental results obtained by testing the device shown in Figures 3A and 3B with an adhesive comprising a metal alloy with a melting point of 138.3°C;

Figures 28-30 are different graphs of experimental results obtained by testing the device shown in Figures 3A and 3B with an adhesive comprising a metal alloy with a melting point of 123.9°C;

Figure 31 is a graph of magnetic field strength versus temperature obtained using the assembly shown in Figures 5A and 5B was tested using the experimental system shown in Figure 9;

Figure 32 is a graph of magnetic field strength versus temperature obtained using the assembly shown in Figures 6A and 6B was tested using the experimental system shown in Figure 9;

Figure 33 is a graph of magnetic field strength versus temperature obtained using the assembly shown in Figure 7 was tested using the experimental system shown in Figure 9;

Figure 34 is a schematic diagram of an exemplary system for conservative evaluation, validation, and monitoring of thermal processing;

Figure 35 is a schematic diagram of a computer system that can facilitate the design of a carrier particle about matching the conservative behavior characteristics of a selected target particle;

Figure 36 is a flow chart that illustrates a process for providing a carrier particle having materials and dimensions to provide characteristics for the carrier particle that about match the conservative behavior characteristics of a selected target particle;

Figure 37 are is an illustration of two screen displays show results indicating that using an overly conservative carrier particle design can result in a potato food particle receiving cumulative lethality in its cold spot up to two orders of magnitude greater than required for commercial sterility;

Figure 38 are is an illustration of two screen displays that show other simulations applied to a carrier particle design and 3/8 inch potato food particle, respectively, under similar conditions;

Figure 39 are is an illustration of two screen displays that show other simulations applied to a carrier particle design and a 0.5 inch x 0.5 inch, cylindrical, potato food particle, respectively, under similar conditions;

Figure 40 are is an illustration of two screen displays that show other simulations applied to a carrier particle design and a 3/8 inch x 3/8 inch, cylindrical, potato food particle, respectively, under similar conditions;

Figure 41 is a schematic diagram of a 0.5 inch, cubic particle design for simulation by a spatial simulation engine;

Figure 42 is an illustration of a screen display showing exemplary simulation results for cubic particle design of Figure 41;

Figure 43 is schematic diagram showing a grid relating to Figure 42 of the result of heating each of its cubes in the thermal processing simulation;

Figure 44 is an illustration of a screen display showing exemplary simulation results for a 0.5 inch TPX carrier particle design;

Figure 45 is a schematic diagram showing a grid of the result of heating the TPX carrier particle design of Figure 44 in the same thermal processing simulation of the target particle;

Figure 46 is <u>an illustration of</u> a screen display showing exemplary simulation results for a 0.5 inch nylon carrier particle design;

Figure 47 is a schematic diagram showing a grid of the result of heating the nylon carrier particle design of Figure 46 in the same thermal processing simulation of the target particle;

Figure 48 is <u>an illustration of</u> a screen display showing exemplary simulation results for a 0.5 inch TEFLON™ carrier particle design;

Figure 49 is a schematic diagram showing a grid of the result of heating the TEFLON™ carrier particle design of Figure 44 in the same thermal processing simulation of the target particle;

Figure 50 is <u>an illustration of</u> a screen display showing exemplary simulation results for a 0.5 inch polypropylene carrier particle design;

Figure 51 is a schematic diagram showing a grid of the result of heating the polypropylene carrier particle design of Figure 50 in the same thermal processing simulation of the target particle;

Figure 52 is a schematic diagram of a 3/8 inch cubic particle design for simulation by spatial simulation engine;

Figure 53 is <u>an illustration of</u> a screen display showing exemplary simulation results for the cubic particle design shown in Figure 52;

Figure 54 is a schematic diagram showing a grid of the result of heating each of cubes in the thermal processing simulation;

Figure 55 is <u>an illustration of</u> a screen display showing exemplary simulation results for a 3/8 inch TPX carrier particle design;

Figure 56 is a schematic diagram showing a grid of the result of heating each of cubes in the thermal processing simulation;

Figure 57 is <u>an illustration of</u> a screen display showing exemplary simulation results for a 3/8 inch nylon carrier particle design;

Figure 58 is a schematic diagram showing a grid of the result of heating the nylon carrier particle design of Figure 57 in the same thermal processing simulation of the target particle;

Figure 59 is <u>an illustration of</u> a screen display showing exemplary simulation results for a 3/8 inch TEFLON™ carrier particle design;

Figure 60 is a schematic diagram showing a grid of the result of heating the TEFLON™ carrier particle design of Figure 59 in the same thermal processing simulation of the target particle;

Figure 61 is <u>an illustration of</u> a screen display showing exemplary simulation results for a 3/8 inch polypropylene carrier particle design;

Figure 62 is a schematic diagram showing a grid of the result of heating the polypropylene carrier particle design of Figure 61 in the same thermal processing simulation of the target particle;

Figure 63 is a schematic diagram of a cylindrical particle design for simulation by spatial simulation engine;

Figure 64 is <u>an illustration of</u> a screen display showing exemplary simulation results for the cylindrical particle design shown in Figure 63;

Figure 65 is a schematic diagram showing a plurality of circular portions and the result of heating each of circular portions in the thermal processing simulation;

Figure 66 is <u>an illustration of</u> a screen display showing exemplary simulation results for a 0.5 inch, TPX carrier particle design;

Figure 67 is a schematic diagram showing a plurality of circular portions of the result of heating the TPX carrier particle design of Figure 66 in the same thermal processing simulation of the target particle;

Figure 68 is <u>an illustration of</u> a screen display showing exemplary simulation results for a 0.5 inch nylon carrier particle design;

Figure 69 is a schematic diagram showing a plurality of circular portions of the result of heating the nylon carrier particle design of Figure 46 in the same thermal processing simulation of the target particle;

Figure 70 is <u>an illustration of</u> a screen display showing exemplary simulation results for a 0.5 inch TEFLON™ carrier particle design;

Figure 71 is a schematic diagram showing a plurality of circular portions of the result of heating the TEFLON™ carrier particle design of Figure 66 in the same thermal processing simulation of the target particle;

Figure 72 is an illustration of a screen display showing exemplary simulation results for a 0.5 inch polypropylene carrier particle design;

Figure 73 is a schematic diagram showing a plurality of circular portions of the result of heating the polypropylene carrier particle design of Figure 72 in the same thermal processing simulation of the target particle;

Figure 74 is a schematic diagram of a cylindrical particle design for simulation by a spatial simulation engine;

Figure 75 is an illustration of a screen display showing exemplary simulation results for the cylindrical particle design shown in Figure 74;

Figure 76 is a schematic diagram showing a plurality of circular portions of the result of heating each of circular portions in the thermal processing simulation;

Figure 77 is an illustration of a screen display showing exemplary simulation results for a 3/8 inch TPX carrier particle design;

Figure 78 is a schematic diagram showing a plurality of circular portions of the result of heating the TPX carrier particle design of Figure 77 in the same thermal processing simulation of the target particle;

Figure 79 is an illustration of a screen display showing exemplary simulation results for a 3/8 inch nylon carrier particle design;

Figure 80 is a schematic diagram showing a plurality of circular portions of the result of heating the nylon carrier particle design of Figure 57 in the same thermal processing simulation of the target particle;

Figure 81 is an illustration of a screen display showing exemplary simulation results for a 3/8 inch TEFLON™ carrier particle design;

Figure 82 is a schematic diagram showing a grid of the result of heating the TEFLON™ carrier particle design of Figure 81 in the same thermal processing simulation of the target particle;

Figure 83 is an illustration of a screen display showing exemplary simulation results for a 3/8 inch polypropylene carrier particle design;

Figure 84 is a schematic diagram showing a grid of the result of heating the polypropylene carrier particle design of Figure 83 in the same thermal processing simulation of the target particle;

Figure 85 is a flow chart that illustrates a process for designing a carrier particle having characteristics about matching the conservative behavior characteristics of a selected target particle;

Figure 86 is an illustration of a screen display of an application providing a dropdown menu for selecting a target food particle for simulation;

Figure 87 is an illustration of a screen display of an application providing a menu for receiving operator input for designing a carrier particle;

Figures 88A and 88B are illustrations of screen displays of an application providing the results of the information entered in the screen display of Figure 87;

Figures 89A and 89B are illustrations of screen displays of an application providing exemplary results of simulation information entered by an operator; and

Figures 90A and 90B are illustrations of screen displays of an application providing exemplary results of other simulation information entered by an operator.